



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

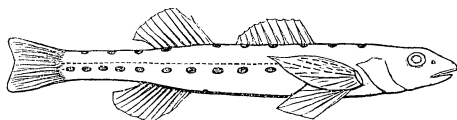
JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

of life commences at the close of the Cretaceous epoch and without any line of separation that can yet be detected continues on upward until only purely fresh-water forms are to be found. Dr. White, an eminent palæontologist and geologist, says that the line must be drawn somewhere between the Cretaceous and Tertiary epochs, but that it will be strictly arbitrary, as there is no well marked physical break to the summit of the Bridger Group.

THE SAND DARTER.

BY D. S. JORDAN AND H. E. COPELAND.

WE have often brought home with us a "Johnny," "Speck," or "Crawl-a-bottom," of a different type from any of those whose habits we already knew.¹ It had a very sharp nose that



(FIG. 4.) THE SAND DARTER.

projected over its mouth; its body was exceedingly slim and round, as transparent as jelly, but firm and wiry to the touch. Its belly and much of its back, after a fashion peculiar to itself, were quite bare of scales, and those along the sides were small and inconspicuous. These peculiarities seemed the more striking as the other darters are scaly, and, along the middle line of the belly especially, they are often covered with hard plates, an arrangement obviously adapted to their "crawl-a-bottom" habits.

After much searching through the scattered and unsatisfactory descriptions which eastern naturalists have given us of the darters found in their bottles of alcohol, we decided that our little friend was the "pellucid darter," or better, the "sand darter" (*Pleurolepis pellucidus*² Agassiz), for reasons soon to be given.

¹ American Naturalist, June, 1876. Page 335.

² As this species is quite imperfectly known to naturalists, we here subjoin its synonymy and a description taken from the average of numerous specimens.

"*Etheostoma pellucidum* Baird MSS., 1853."

Pleurolepis pellucidus Agassiz in Putnam's Bulletin Mus. Comp. Zool., 1863, 5. Cope, Cyprinidæ of Penn., Supplement, 1866, 401. Le Vaillant, Recherches sur les Poissons, etc., 1874. Jordan, Indiana Geol. Survey, 1874, 214. Manual Vertebrates, 1876, 221. Jordan and Copeland, Check-List, Bull. Buffalo Soc. Nat. Hist., 1876, 135. Nelson, Bull. Ills. Mus. of Nat. Hist., Dec., 1876, p. 35. Jordan and Gilbert, Fishes of Indiana, Indiana Farmer for Jan. 17, 1877.

Our aquarium had been arranged for the convenience of our old etheostomoid friends, and the bottom was thickly covered with stones, among which a small fish might easily hide. Several days passed after the introduction of the first *Pleurolepis* that survived the change of water, when it was noticed that it had disappeared. Careful search among the stones and around the geode only made it the more certain that it had gone, and increased our wonder as to the way, for surely it had not been eaten, nor had it jumped out, unless like Ariel it could assume a "shape invisible." Finally, after retracing every inch of the ground, there was discovered under the nose of *Boleosoma*, which was standing as usual on its hands and tail, the upper edge of a caudal fin, and on each side of Boly's tail appeared a little black eye set in a yellow frame. *Pleurolepis* was buried! Was he dead? Slowly one eye was closed in a darter's inimitable way, for they can outwink all animals in creation except owls, and the touch of a finger on its tail showed that it had lost none of its activity. It was quite improbable that it had been accidentally buried so completely, a small spot, therefore, was cleared of stones, leaving the hard white sand exposed, and we awaited developments.

There for days we watched it closely, only to learn that it could bury itself with great celerity, for it was never caught in the act. Our patience was at last rewarded, however, for as we came out to breakfast one morning it put its nose, that we now

Generic Characters. Body nearly cylindrical, very slender, the depth being contained six to eight times in the length of the body, to base of the caudal; the breadth of the body about the same as the depth; head long, pointed, the upper jaw longest; lateral line very distinct, complete; scales thin, small, punctate, especially above, with fine black dots, far apart and deeply imbedded, obscure on the back, but generally present; wanting on the belly, readily evident only along the lateral line and on the opercles; fins rather low (as compared with other darters), the dorsal fins well separated; anal spines two; intermaxillaries projectile, the skin of the upper lip not continuous with that of the forehead; teeth minute, on jaws and vomer; mouth comparatively wide, much as in *Etheostoma*; branchiostegals six, their membrane broadly connected across isthmus.

Specific Characters. Head four to four and half in length of body, without caudal; eye large, rather high up, its diameter a trifle less than length of snout, forming about one fourth of the length of the head; iris gilt. Body pinkish-white, or faintly olivaceous, perfectly pellucid in life; a series of small squarish olive blotches, lustrous steel blue in life, along the back and another on each side, these connected by a gilt line. Fin rays: D. x. 9; A. ii. 8; first dorsal longer and lower than second, which is smaller than the anal fin. Length two to three inches.

Habitat. Ohio Valley, Youghiogheny R. (Cope), Eastern Ohio (Dr. Kirtland's Coll.), White R., Ind. (Jordan and Copeland), frequenting sandy bottoms of clear streams.

Pœcilichthys vitreus, Cope (Proc. Am. Phil. Soc., 1870, p. 263), probably belongs to this genus.

know has a tip nearly as hard as horn, against the bottom, stood nearly straight on its head, and with a swift beating of its tail to the right and left was in less than five seconds completely buried. The sand had been violently stirred, of course, and just as it had nearly settled, probably in less than half a minute, its nose was pushed quietly out and, settling back, left the twinkling eyes and narrow forehead alone visible.

Since then we have kept scores of them in an aquarium arranged especially for their convenience, and have often seen them burrow into the sand. They will remain buried as long as the water is pure and cool, and indeed we now rely nearly altogether upon them to warn us when the water needs changing. They then come out and lie on the bottom, panting violently. We have been unable to discover any immediate incentive for the act. It seems to be entirely unpremeditated. A number of them in confinement lie helplessly on the bottom, motionless and slowly breathing, when one suddenly starts and buries its head and neck in the now whirling sand by a motion as quick as thought, a headless tail beats frantically about, and when the clean sand lies smoothly on the bottom again the little eyes are looking at you like two glistening beads, as if to witness your applause at so clever a trick.¹

We never have seen a *Pleurolepis* taste of food, nor do we expect to, for although its mouth bristles with teeth its small size forbids an attack on any game which we can offer. Its quiescent habits, and the character of the bottoms to which it confines itself, seem to indicate that its prey is minute if not microscopic. But speculation about what we don't know as to its food might lead us to speculation as to the mode of evolution of its characteristic features; how, for instance, the hard snout and the burrowing habits are consequent upon the loss of scales, or how the loss of unnecessary scales are consequent on its burrowing habits, matters not within the defined scope of this article.

Specimens of this species may be readily obtained in regions where it occurs. We have taken at one drawing of a fine-meshed minnow net, no less than twenty-four individuals over a sand-bar in White River, above Indianapolis, where the usual depth of the water is about two feet.

¹ Since this article was written, a small *Boleosoma* (*B. brevipinne* Cope), in Professor Copeland's aquarium has been noticed to bury himself in the sand as persistently as the *Pleurolepis* does, and in similar fashion. In no other individual of this species, and in no other species excepting the "Sand Darter," have we noticed this habit, although during the last two years we have had hundreds of individuals under examination. — D. S. J.